



Texaco

November 6, 1986

TO: File

FROM: G. A. Turl

SUBJECT: Formation Fluid Sampling From WD-1  
(Santa Margarita) - October 16, 1986

Based upon statements from Mssrs. Clark Brannin (Texaco Drilling Engineer) and Alan Spencer (Texaco Environmental Technician), the following is pertinent information relative to the events leading to the subject sampling and analysis:

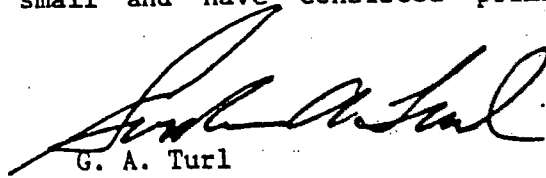
1. On October 15, 1986, cement was drilled out (inside the 8-5/8" casing) to 5170', and the inside of the casing was scraped clean.
2. The fluid level inside the casing was removed from inside the casing so that the top of the water column was at 1900' below ground level. This insured perforation would be 'underbalanced'. That is, the pressure inside the casing was less than the formation pressure. This is desirable so that when the perforations are shot, fluid flows from the perforations into the casing (thus cleaning the perforations).
3. The casing was perforated with four, 1/2" holes per foot from 4875' to 5075'.
4. When the last gun was run into the hole (to shoot the top 20', ie from 4895' to 4875') the fluid level was approximately 460'. Therefore, the fluid level had risen from 1900' to 460'. This volume of water (3686 gallons) was all formation water.
5. On October 16, 1986, at 5:30 P.M., eight water samples were taken from the well. Pool Well Service Co. (contractor) retrieved the fluid from the zone. Samples taken were placed in the following containers by Texaco's Environmental Technician accorded to accepted procedures:

- |     |                |                        |
|-----|----------------|------------------------|
| - 4 | VOA's, EPA 624 |                        |
| - 1 | 500 ml/plastic | CAM Metals             |
| - 1 | 500 ml/plastic | Chloride, Sulfate, TDS |
| - 1 | Quart/glass    | Oil, Grease            |
| - 1 | Quart/glass    | EPA 625                |

The first time the bailer was brought up it was empty, apparently due to a malfunction. On the second try, the bailer was brought to surface and it contained water. After bailer was brought to surface, the contractor had to unplug the end of the bailer because it was packed with sand. Finally, the bailer was unplugged and the water sample from bailer was put into a cut off five gallon plastic drinking water container.

From this container, the eight sample bottles were filled. The water had a slight hydrocarbon odor, blackish grey in color with a brown foamy type appearance of oil floating on top.

Based upon these procedures, the water samples taken were definitely felt to represent Santa Margarita formation water at this location. Any contamination would have been small and have consisted primarily of bentonite clay and fresh water.



G. A. Turl

GAT/nrb  
193/86



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PHONE (415) 682-7960

24 November 1986

Mr. Gordon Turl  
Texaco Refining and Marketing, Inc.  
6451 Rosedale Highway  
Bakersfield, CA 93302

Dear Gordon:

Please find attached the backup from our laboratory regarding the analytical methodology used for the injection well samples. As we discussed, the samples were analyzed in the emulsion form (2 phase oil and water).

We hope this information is useful to you. Please do not hesitate to call should further clarification be needed. Thanks again for your interest and we hope WESTON can continue to support your efforts at the Bakersfield Refinery.

Sincerely,

ROY F. WESTON, INC.

Lynne M. Preslo  
Project Manger, Hydrogeologist

LMP:ed

Attachment

# Inter-Office Memorandum



TO: Lynne Preslo

FROM: David Ben-Hur

DATE: November 24, 1986

PROJECT: Texaco

LAB NO. 86-10-047

SUBJECT: Injection Zone Samples

ACTION:

In preparing the samples for analysis, the following methods have been used:

a. Hazardous substances list - organic.

1. Volatiles - EPA Method 5030. The sample was taken "as is" (oil and water phases). Because the sample was high in hydrocarbons, it required a 1:10 dilution.
2. Semivolatiles - EPA Method 3510, separatory funnel liquid-liquid extraction. The sample was taken "as is" for extraction. The extract resulted in solvent, emulsion and water phases. The resulting emulsion was centrifuged and the solvent portion was combined with the previous solvent extract and analyzed.

b. Metals (B, Ba, Cd, Sb, Be, Co, Mo, Tl, Zn, Cr, Pb, Fe, Ag, Ca, Mg, Na, K, Mn, Cu, Ni, V, Sr) - EPA Method 3020, nitric acid digestion.

c. Mercury - EPA Method 245.1, Cold Vapor.

d. Arsenic - EPA Method 206.3, Hydride.

e. Selenium - EPA Method 270.3, Hydride.

All other parameters were analyzed in accordance with the methods specified in "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020.

Formation Fluid Analysis  
Red Ribbon WD - 1

Samples of formation fluid were taken on January 26, 1989, during re-perforation of Red Ribbon WD-1. Samples were analysed as shown on the attachment.

In order to sample with minimum contribution from previously injected water it was necessary to set a bridge plug above the existing perforated interval. The casing was perforated and several well volumes were removed from the well by swabbing.

Samples were taken by two methods:

**Inorganics & EPA 8270:** Samples were taken at the well head after removal of several well volumes by swabbing.

**EPA 8240:** Samples for volatiles were taken with a "Wofford" sampler. This device maintains sample integrity by preventing out-gassing of volatiles. Two sets of samples were analyzed; the first set was taken from the Wofford sampler at the well head, the second set was sent to Core Labs in Dallas. Core labs uses a method to sample from a Wofford sampler that allows for the analysis of any off-gases. The sample did not have sufficient gas to quantify the Benzene and Toluene concentrations. Sample vials were prepared at Core Labs and returned to the Laboratories shown in the attachment.

# Formation Fluid Analysis

Red Ribbon WD-1

BC Labs

Enseco

## Metals

## Units

Sb	mg/kg	< 3.5	< 0.1
As	mg/kg	< 0.35	0.008
Ba	mg/kg	0.93	0.17
Be	mg/kg	< 0.35	< 0.01
Cd	mg/kg	< 0.35	< 0.01
Cr	mg/kg	0.62	0.26
Co	mg/kg	< 1.75	< 0.02
Cu	mg/kg	3.69	0.92
Pb	mg/kg	1.97	0.68
Hg	mg/kg	< 0.07	0.002
Mo	mg/kg	< 1.75	0.04
Ni	mg/kg	< 1.75	0.12
Se	mg/kg	< 0.35	< 0.01
Ag	mg/kg	< 0.35	< 0.02
Th	mg/kg	< 3.5	< 0.1
V	mg/kg	< 0.35	< 0.02
Z	mg/kg	5.01	1.1

## General Minerals

Ca	mg/l	188	123
Mg	mg/l	14	78
Na	mg/l	670	685
F	mg/l		< 0.1
K	mg/l	16	20
Cl	mg/l	1765	1600
SO4	mg/l	1200	1100
Fe	mg/l	40.1	44
Mn	mg/l	1.5	1.4
TDS	mg/l	2770	3020
Phenols	mg/l	5.4	6.4
TSS	mg/kg	756	300
Sulfide	mg/l	250	133
TOC	mg/l	185	279
Ammonia-N	mg/l	740	820
Cond.	umhos/cm	9400	8400
pH		8.5	8.53

# Formation Fluid Analysis

Red Ribbon WD-1

BC Labs

Enseco

Zalco

Core Labs

## EPA 8270

		BC Labs	Enseco	Zalco
2,4-DMP	ug/l	453	< 50	730
Phenol	ug/l	34 (1)	750	820
2-mPhenol	ug/l	253 (1)	230	1600
4-mPhenol	ug/l	138 (1)	430	2200
Benzoic Acid	ug/l	(2)	7900 (4)	(2)
Naphthalene	ug/l	70 (1)	110	140
2-mNaphthalene	ug/l	151 (1)	73	100

## EPA 8240 - "Wofford" sampler

		BC Labs	Enseco	Zalco
Benzene	ug/l	1493	7300	10500
E-Benzene	ug/l	3820	6100	6600
Toluene	ug/l	3168	7300	4600
o-Xylene	ug/l	67400	31000 (3)	22300 (3)
p-Xylene	ug/l	10300		
m-Xylene	ug/l	6430		

## EPA 8240 - "Wofford" sampler, prepared by Core Labs

		BC Labs	Enseco	Core Labs
Acetone	ug/l		3000	11000
Benzene	ug/l	735	9200	7000
E-Benzene	ug/l	5280	4500	8700
Toluene	ug/l	1641	7500	29000
o-Xylene	ug/l	59000	22000 (3)	
p-Xylene	ug/l	8090		
m-Xylene	ug/l	5280		
1,1,1-TCE	ug/l	910	3000	3200

### Notes:

- (1) - Possible error in calibration
- (2) - Not Reported
- (3) - Total Xylenes
- (4) - Estimate Value Only, outside calibration range